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NEW AND LITTLE-KNOWN SPECIES OF SOUTH AND CENTRAL AMERICAN LAND SNAILS (BULIMULIDAE)

By JUAN JOSÉ PARODIZ

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NEW AND LITTLE-KNOWN SPECIES OF SOUTH AND CENTRAL AMERICAN LAND SNAILS (BULIMULIDAE)

By Juan José Parodiz[1]

The present paper describes new species of land shells of the family Bulimulidae from South America, and a few from Central America, on the basis of specimens in the collection of the United States National Museum; other little-known species are also discussed. The study was accomplished under a fellowship granted to the writer by the John Simon Guggenheim Memorial Foundation, of New York, for researches on Neotropical mollusks. About a thousand South American species of the family were examined, many of which may need to be reclassified into the different, and at present numerous, genera and subgenera. This reclassification will be the subject of a future, more extensive, and comprehensive paper; at this time only some of the more immediately interesting observations are given.

Forty-six species or subspecies are discussed in this paper; of these, the following eight are described as new:

Bulimulus corderoi, from Uruguay
Bulimulus moei, from Argentina

[1] Curator of Invertebrates, Carnegie Museum, Pittsburgh, Pa

Drymaeus rehderi, from Colombia
Drymaeus megastomus, from Costa Rica
Drymaeus waldoschmitti, from Peru
Drymaeus poecilus tricinctus, from Bolivia
Protoglyptus minutissimus, from Bolivia
Odontostomus fasciatus tenuisculptus, from Colombia

One new name, *Plekocheilus ameghinoi*, is proposed for a species from Colombia bearing a homonymous name.

In the discussions of each species, specimens from other museums are indicated by their initials: Museum of Comparative Zoology at Harvard University (MCZ), Carnegie Museum, Pittsburgh (CM), Museo Argentino de Ciencias Naturales, Buenos Aires (MACN).

The author wishes to express his appreciation to those persons who helped make this study possible: Dr. Waldo L. Schmitt, formerly Head Curator of Zoology at the U.S. National Museum, and Dr. Harald A. Rehder and all the members of the Division of Mollusks of the same museum for the extensive facilities placed at my disposal; Dr. Fritz Haas, Curator Emeritus, Division of Lower Invertebrates, Chicago Museum of Natural History, Dr. William J. Clench, Curator, Department of Mollusks, Museum of Comparative Zoology, and Dr. Joseph P. Bequaert, for their friendly and valuable suggestions.

Subfamily Bulimulinae

Genus *Bulimulus* Leach, 1815

Bulimulus corderoi, new species

PLATE 2, FIGURE 15

Shell rimate, thin, diaphanous, elongated, diameter less than half of the length; 5½ whorls, little convex; spire short in proportion to the last whorl which is longer than two-thirds of the height; penultimate whorl less than half of the spire. Suture regularly impressed. Color whitish, clearer at the sutures, rarely with very pale brownish stripes. Surface not polished and without any particular sculpture except some occasional very fine, microscopical incisions, and the very irregular lines of growth. Aperture oval elongate, almost half of the total length of the shell, with peristome very thin and the umbilicus covered in part by the columellar margin of the lip.

Holotype (USNM 348777) collected by H. M. Smith at La Coronilla, northeast coast of Uruguay, July 12, 1922. It measures: Height 22 mm., diameter 10.5 mm., last whorl 16 mm., aperture 10.4x6 mm. Nine paratypes. There is another separated paratype (young) under a different number (USNM 527653).

In comparison with this new species, I have reviewed eight specimens of the original type lot of *Bulimulus gorritiensis* Pilsbry 1897 (USNM 157653) from Gorriti Island (the species also occurs on Lobos Island), which proved to be a very different form (fig. 14): *B. corderoi* is larger, more elongate and thinner, with less convex whorls, a narrower base of the aperture, a shorter spire with more horizontal suture, a paler color, and the columellar lip not twisted to the left; it is also more easily distinguishable from *B. bonariensis montevidensis* Pfeiffer, 1846 (=*sporadicus montevidensis*).

This species is dedicated to the late Dr. Ergasto H. Cordero, former Director of the Museo de Historia Natural de Montevideo, and a great contributor to our knowledge of the invertebrate fauna of the countries of the Río de la Plata.

Bulimulus moei, new species

PLATE 2, FIGURE 13

Shell rimate perforate, very globose, thin, calcareous, white. Whorls 6¼, the last occupying four-fifths of the total length. Spire very short with suture sinuous, marked with the initiations of folds of growth which are very irregular and especially conspicuous on the last half of the body whorl; no other type of sculpture present. The worn protoconch shows traces of vertical waved lines. Aperture nearly two-thirds the total length and equal to the lesser diameter. Columellar lip triangular, very broad above, covering in part the perforation; peristome very thin.

Holotype (USNM 349118) from the northeastern part of the province of Salta, Argentina, at 800 feet, collected by D. S. Bullock, July 28, 1921. Measurements: Height 25 mm., larger diameter 19.5 mm., lesser diameter 17 mm., last whorl 21 mm., aperture 17x10 mm. There is another smaller specimen, (USNM 109594) collected in Peru by S. J. Emmons of the U.S. Geological Survey, which is assigned provisionally to this form, but it differs in being variegated like *B. apodemetes* d'Orbigny, 1835, and in having no traces of nepionic sculpture pl. 2, fig. 12).

The largest diameter is not, as in other Bulimuli, between the anteroposterior margins, but is across the dorsal-ventral line; for this reason it seems to be one of the most obese forms of *Bulimulus*. Compared with *moei*, *apodemetes* d'Orbigny is smaller, slenderer, and has more corneous stripes and spots. Compared with *B. apodemetes dispar* Hylton Scott, 1952, from the same province of Salta, our new species is larger, has a more rounded aperture, and the last whorl is more dilated; *dispar* is also less obese than *apodemetes*, a remarkable difference.

The species is named in honor of Dr. Henry Allen Moe, Secretary General of the John Simon Guggenheim Memorial Foundation.

Bulimulus coagulatus (Reeve)

Bulimus coagulatus Reeve, Conchologia iconica, vol. 5, *Bulimus*, pl. 77, fig. 558, 1849.

Bulimulus (*Bostryx-Lissoacme*) *coagulatus* Pilsbry, Manual of conchology, ser. 2, vol. 10, p. 161, 1897.

Type locality: Lima, Peru.

The embryonic sculpture of the protoconch in this species is not smooth as in *Bostryx* or *Lissoacme*, but is obliquely waved as in *Bulimulus*.

Bulimulus bonariensis morenoi Preston

Bulimulus (*Drymaeus*) *morenoi* Preston, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 494, 1907.

Bulimulus bonariensis morenoi, Parodiz, Nautilus, vol. 70, p. 133, 1957.

Type locality: Argentina (very probably from province of Buenos Aires). Not a *Drymaeus* but a typical *Bulimulus* with a few interrupted microscopic spiral lines on the nucleus, not regular and conspicuous as in the subgenus *Scansicochlea*. Preston also assigned other species to *Drymaeus* in the vague sense as used prior to Pilsbry's nomenclature of 1897, which belong to different genera (e.g., *chacoensis* to *Protoglyptus*, *nigroumbilicatus* to *Peronaeus*). The type specimen of *morenoi* is shorter and more solid, yellower, and more polished than the common *bonariensis* (=*sporadicus*). The variations of this species deserve further study.

Under the name *Siphalomphix bonariensis* I have found an original description by Rafinesque (Atlantic Journal and Friend of Knowledge, no. 5, p. 165, 1833), as follows:

> *Siphalomphix* N.B. Shell conical, opening oval acute, rounded, columella twisted with a tubular ombilic [sic]. It differs from *Agathina* by the columella and the ombilic. *S. bonariensis* or *Ag. bonariensis* Raf. Six spires tip nearly obtuse, first spire with a transversal angle—shell about one inch, semi-transparent, brittle.

The locality of the specimen is given in the title of the article, "New genera of land shells from Buenos Aires, South America."

Although this diagnosis is rather ambiguous, as are many others of the same author, it is possible to recognize from it the *Bulimulus sporadicus bonariensis* Strobel, 1874, which is the only form from that area with same proportions and color. No other true *Bulimulus* is found near Buenos Aires. Rafinesque's publication antedates by 2 years that of d'Orbigny's *Bulimulus sporadicus* (originally *Bulimus*) which has been in use since 1835. Therefore, the typical *sporadicus sporadicus* d'Orbigny, which is a northern form, is a subspecies of *bonariensis*

Rafinesque, which becomes the typical form of the species; *bonariensis* Strobel is the same form. *Siphalomphix* Rafinesque, 1833, becomes, of course, a synonym of *Bulimulus* Leach, 1814.

The typical *Bulimus bonariensis* is now rather scarce; I have, however, examined more than a hundred specimens (in MACN) collected during the last 30 years from localities near Buenos Aires (no more than 50 miles distant): Olivos, San Isidro, Zelaya, Jauregui, Zárate, Campana, Escobar, Villa Guillermina, Punta Lara, and south of that city (about 175 miles) in Pirán.

Following the change in names outlined above, the correct nomenclature and the distribution of the known subspecies are:

Bulimulus bonariensis bonariensis (Rafinesque)	Buenos Aires, Argentina.
Bulimulus bonariensis sporadicus (d'Orbigny)	Northern, eastern, and central Argentina; and Bolivia.
Bulimulus bonariensis montevidensis (Pfeiffer)	Uruguay.
Bulimulus bonariensis schadei (Schlesch)	Paraguay.
Bulimulus bonariensis gracilis (Hylton Scott)	Salta, Argentina.
Bulimulus bonariensis morenoi (Preston)	Argentina.

Bulimulus hendersoni Marshall

Bulimulus hendersoni Marshall, Nautilus, vol. 46, p. 100, 1931 (new name for *B. felipponei* Marshall, 1930, not *B. felipponei* Ihering, 1928).

The type of *B. hendersoni* (USNM 380691) is closely related to *B. bonariensis montevidensis* (Pfeiffer), and probably is an individual form of that subspecies. See observations immediately following regarding *B. felipponei* Ihering, which caused the change of the name by Marshall.

Bulimulus rushii Pilsbry

Bulimulus rushii Pilsbry, Nautilus, vol. 10, p. 76, 1896.
Bulimulus rushii, Parodiz, Com. Zool. Mus. Montevideo, vol. 1, no. 8, p. 4, 1944; also Nautilus, vol. 70, p. 133, 1957.
Bulimulus (*Scutalus*) *felipponei* Ihering, Nautilus, vol. 41, p. 95, 1928.

In the revision of 1944 I did not include *B. felipponei* Ihering in the synonymy of the species. At the present time we can identify this unfigured Ihering's species as an individual variation of *B. rushii*. I have seen specimens of *rushii* which are larger than *felipponei* (27 mm. high by 16 mm. in diameter). *B. felipponei* may also be compared with *B. vesicalis uruguayanus* Pilsbry, but the latter species differs, principally in the character of its peristome.

B. felipponei is not a *Scutalus*. In fact there are in Uruguay no species of *Scutalus*, which is a genus of western South America from Ecuador to northern Argentina. Ihering compared his *felipponei* with "Bulimulus peristomatus" Doering, which is actually a subspecies of

Neopetraeus stelzneri Dohrn from central Argentina. Ihering never saw specimens of *peristomatus;* after its description in 1879 it was not found again until 1944, when I examined specimens from the type locality (Chancani, Córdoba, Argentina).

Numerous lots of *Bulimulus rushii* (in the USNM, MCZ, and MACN collections) have been reviewed, the species being distributed in southern and western Uruguay, and the provinces of Entre Ríos and Corrientes in Argentina. Numerous specimens, with well-preserved periostracum, from Arroyo Yacui, Artigas, northern Uruguay, were received recently from my colleague, Mr. M. A. Klappenbach, of the Museum at Montevideo. Living, it is not found west of the Paraná River, but in the province of Buenos Aires there are subfossil specimens in the Pleistocene beds at Tolosa, near La Plata.

Bulimulus vesicalis uruguayanus Pilsbry

Bulimulus vesicalis uruguayanus Pilsbry, Manual of conchology, ser. 2, vol. 10, p. 69, 1897. Parodiz, Nautilus, vol. 70, p. 133, 1957.

Type locality: Cerro de Montevideo, Uruguay.

One specimen from Paraguay (USNM 381378) has certain affinities with this species, which is, however, more peculiar to the southwestern part of Uruguay, in Paysandú, Soriano, and Canelones, according to the many specimens that have been examined in the U.S. National Museum as well as in the Museum of Comparative Zoology and Museo Argentino de Ciencias Naturales; most of the specimens in these collections were labelled as *rushii*, from which this species differs by its rimate perforation, longer and thinner shell, and well-marked zigzag nepionic sculpture, which in *rushii* is weakly waved; it also differs from any of the varieties of *Bulimulus bonariensis* Rafinesque (=*sporadicus*) by its peculiar unbilical area. Formica Corsi's figure for *sporadicus* (Anales Nac. Montevideo, vol. 2, p. 291, 1900) is very probably *vesicalis uruguayanus*. In addition, I examined specimens from Piedras Blancas, Uruguay, which are larger than those of Pilsbry's type lot: Height 27.5 mm., diameter 15 mm., aperture 14 mm.

In Argentina it is found only as subfossil in the Pleistocene of Buenos Aires.

Bulimulus jujuyensis Holmberg

Bulimulus (*Thaumastus*) *jujuyensis* Holmberg, Apuntes Hist. Nat., vol. 1, p. 11, 1909.

Bulimulus jujuyensis, H. Scott, Rev. Mus. La Plata, Zool., vol. 4, p. 206, 1945.

Bulimulus jujuyensis, Parodiz, Nautilus, vol. 70, p. 134, 1957.

Type locality: Tilcara, Quebrada de Humahuaca, Jujuy, Argentina.

The type specimen and other specimens (in MACN) from the type locality as well as from Formosa, which is east of Jujuy, were examined.

All the other specimens (in USNM, MCZ, and in the Hylton Scott Collection) are from Jujuy.

The protoconch is typically that of *Bulimulus* s.s., but sometimes it has characters transitional with *Scansicochlea*.

Genus *Drymaeus* Albers, 1850

Drymaeus rehderi, new species

PLATE 1, FIGURES 5, 8

Shell widely rimate umbilicate, ovate conic, rather solid; white, shining except the first 1½ whorls which are dirty yellow; in the last whorl are some obscure, very inconspicuous vertical spots. Six whorls comprise the last three-fifths of the total length; the width of these whorls is more than three-fourths of the total length. Surface apparently smooth, but with fine and regular marked growth striae. Suture somewhat marginate and at its end, near the lip, crenulated and curved upward, so that the spire is excessively inclined in a profile view when the lip is in a vertical position and the penultimate whorl appears immersed into the last whorl; the crenulations of the suture are formed by the aggregation of five or more lines of growth; a low keel at the base of the last whorl corresponds to a sinus on the left base of the peristome. The columellar lip has a margin in the form of an elongated S; the inside of the lip is lilac tinted and becomes more violaceous on the columella; a white margin, about 1.5 mm., lies between the violaceous strip and the edge of the lip; the peristome is well expanded.

Holotype: USNM 590653, Valdivia, Antioquia, Colombia, at 4500 feet on the Cordillera Oriental, collected by M. A. Carriker, June 1948. It measures: Height 37 mm., diameter 22 mm., last whorl 24.5 mm., penultimate whorl 6 mm., aperture 20.5x16 mm.

This beautiful new species is related to *Drymaeus glaucostomus* Albers, but that species has three blackish bands, a suture not crenulated nor margined, and straight columella, and is a smaller size. *D. fairchildi* Bequaert seems to be another close species, but it is entirely white within the aperture, is carinate in the middle of last whorl, and has a simple peristome.

I have the pleasure to name this species in honor of Dr. Harald A. Rehder, Curator of Mollusks at the U.S. National Museum.

Drymaeus megastomus, new species

PLATE 1, FIGURE 7

Shell large with short spire, narrowly perforated, rather thin and transluscent. Five and a half whorls, the first very flat and the following increasing rapidly, the last being extraordinarily developed, equal to a little more than two-thirds length, and its diameter more

than half the same length. Suture well defined but not deep, with a narrow zone clearer than the rest of the whorls which are pure white and almost polished, without any sculpture except some very faint lines of growth noticeable behind the reflexed lip. Protoconch with the sculpture of *Drymaeus* but very fine. Aperture large, with columellar lip very wide and vertical, forming an angle of 120° with the parietal wall; base of lip angulated at left, the outer lip continuing in a gradual curve to the superior end which is also angulated; the lip in all its perimeter is broad and expanded, clear cream colored. No callus between the ends of peristome.

Holotype (USNM 98230) from Costa Rica, collected by José C. Zeledón (evidently prior to 1890). One paratype (USNM 621510).

Another specimen (USNM 596732) was collected by A. Wetmore and W. M. Perrygo in March 1951 at Cerro Campana, Panama.

The three specimens measure (in mm.):

	Height	*Diameter*	*Last whorl*	*Aperture*
Holotype	42. 5	22. 5	31. 2	24x16. 5
Paratype	40	22	29. 5	22x16
Panama specimen	38. 5	21	28. 5	21. 5x16

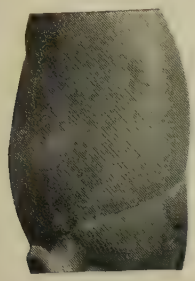
These specimens are larger than any of the varieties of *Drymaeus josephus* (Angas) with which the new species shows affinities; it would seem at first sight to be a giant shape of *josephus*, near the form *concolor*, but the proportions and form of the shell are quite different. Another species with which it may be related is *Drymaeus latitesta* Haas, but this is a Peruvian species, shorter and wider, and with a colored spiral band; the most noticeable affinity among the three species is the faint nepionic structure, which in other species of *Drymaeus* is more strongly pitted.

The type lot was labelled by Dall as "*Bulimus pallidior zeledoni* Dall, Fig'd types." This denomination must have been prior to the description of *B.* (*Leptobyrsus*) *zeledoni* Dall (=*Drymaeus josephus*, after Pilsbry), and the specimens remained with the label without correction. These are, of course, not the types of that species, for the true types of *zeledoni* Dall, cited in the original description (Proc. U.S. Nat. Mus., vol. 16, p. 644, 1893) as USNM 98231, are in the collection labelled as types. *D. megastomus* differs markedly from Dall's species, which is a synonym of *D. josephus concolor* Martens.

Drymaeus waldoschmitti, new species

PLATE 2, FIGURE 16

Shell rimate, oval conic, shining, half as wide as the height, last whorl about three-fourths the height, and the penultimate one-sixth the total length. Five whorls very little convex, the last with a median and very low carina which continues the line of the suture



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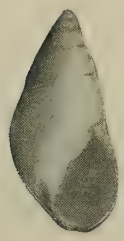

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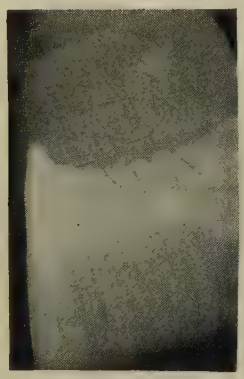

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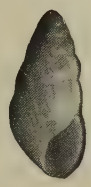

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FIGURES 1–8.—1, *Odontostomus fasciatus tenuisculptus*, new subspecies, sculpture ×2; 2, ×9/10. 3, *Bulimulus bonaerensis morenoi* (Preston), ×1–1/5. 4, *Protoglyptus cutisculptus* (Ancey), ×1½. 5, *Drymaeus rehderi*, new species, sculpture ×2. 6, *Protoglyptus minutissimum*, new species, ×2½. 7, *Drymaeus megastomus*, new species, ×6/7. 8, *D. rehderi*, new species, same size.

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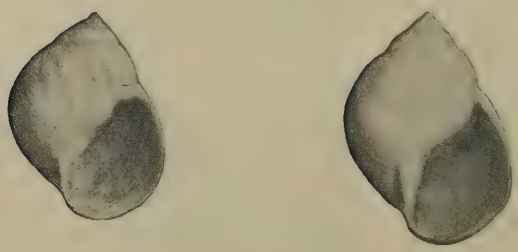

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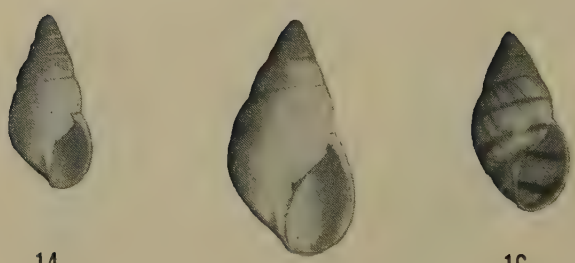

14 15 16

FIGURES 9–16.—9, *Drymaeus peocilus ictericus* (Ancey), same size. 10, *D. p. minor* (d'Orbigny), same size. 11, *D. p. tricinctus*, new subspecies, ×1½. 12, *Bulimulus* aff. *moei*, ×1¼. 13, *B. moei*, new species, ×1¼. 14, *B. gorritiensis* Pilsbry, ×1¾. 15, *B. corderoi* new species, ×1½. 16, *Drymaeus waldoschmitti*, new species, same size.

and ends at the middle of the outer lip. Protoconch with the fine pitted structure of *Drymaeus*. The first four whorls white roseate; in the third whorl a median chestnut spiral band is initiated; another chestnut band comes out from the superior angle of the aperture and runs a little below the carina: a third band covers the umbilical zone from the supracolumellar end of the aperture to the basal lip; these three bands are connected with another of the same color which forms a dark and broad margin on the outer side of the lip and leaves only a narrow white zone of a half mm. along the edge. Numerous axial oblique bands, clearer in color than the spirals, are present in the last whorl (about 29 in number) separated by very variable spaces; at the points where these axial bands meet the carina, a darker spot is produced, and the carina is, therefore, marked with a spotted spiral line. The rest of the surface of the last whorl is cream or ivory white. Aperture oval, wide in the base; columella almost straight, white; peristome simple; the interior of the aperture is well marked with the spiral bands, but the axials are seen only by transmitted light. The surface of the shell is smooth, marked only with the growth lines and without the microscopical spiral lines we find in *D. poecilus*.

Holotype (USNM 609317) from Peru (The specimen was in a lot with two specimens of *D. poecilus*). Measurements of holotype: Height 23.2 mm., larger diameter 11.5 mm., lesser diameter, 10 mm., last whorl 17.7 mm., penult. whorl 3.8 mm., aperture 12x7 mm.

The specimen is a perfect, well-developed adult, not a young of *poecilus*, as one might think from its carination; the carination is indeed a peculiar feature of the species, which is also very distinct in its color pattern and proportions; I have examined several hundred specimens of *D. poecilus* presenting all kinds of subspecific and individual variations, and from all of them this specimen is remarkably different. It also resembles *D. multilineatus* (Say), but besides its distinct geographical range, *multilineatus* is a more elongated species with a dark subsutural but no median band, is not carinated, and its whorls are more convex.

The species is dedicated to my friend the distinguished zoologist, Dr. Waldo L. Schmitt, formerly Head Curator of Zoology at the U.S. National Museum.

Drymaeus interpunctus (Martens)

Bulimulus interpunctus Martens, Sitzb. Ges. Natf. Freunde, p. 161, 1886.

Drymaeus interpunctus Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 287,1898.
Parodiz, Nautilus, vol. 71, p. 25, 1957.

Type locality: Piracicaba, São Paulo, Brazil.

If the locality "Uruguay" (USNM 530524, coll. Chamberlain) is correct, the southern limit of this species is greatly extended.

Papyraceus (Mawe) is the only well-known *Drymaeus* from that country. *D. interpunctus* belongs to the group of *poecilus*. I have seen other specimens (CM 62.40524) from São Leopoldo, near Porto Alegre, Rio Grande do Sul, Brazil (the label has the handwriting of von Ihering), and also another specimen in the Museo Argentino de Ciencias Naturales from Puerto Aguirre, Iguazú Falls, Misiones, Argentina, which is an intermediate western point between the type locality and that of Porto Alegre. Thus, this species is distributed east of the Paraná River in the north, and west of the Uruguay River in the south.

This shell immediately recalls *Succinea* by its shape, color, and thinness. The species is peculiarly separated from all the other known species of *Stenostylus* by the fact of its occurrence on the opposite side of the continent; the connection with the western species has probably taken place along the Rio Negro. The nearest species is *D.* (*S.*) *colmeiroi* Hidalgo, from Ecuador. The subgenus *Stenostylus* seems to be rather limited in number of forms and specimens. The only species from the west that I had an opportunity to examine is *D.* (*S.*) *troscheli* (Philippi) from Peru (in the Museum of Comparative Zoology).

Drymaeus (*Stenostylus*) *succineus* (Pilsbry)

Drymaeus succinea Pilsbry, Manual of conchology, ser. 2, vol. 14, p. 160, 1902.

Type locality: Marajo Island, mouth of the Amazon River, Brazil.

Complementary description: Shell succineiform, very glossy, with almost 5½ whorls (original description indicated only 4¾ whorls), the last being a little more than four-fifths the height, and the diameter three-fifths the total length. Suture simple, scarcely inclined (6°) but waved; surface polished with wide lines of growth. Protoconch perfectly punctate as is peculiar in *Drymaeus* and with reticulation easily distinguishable; this sculpture is continued to the beginning of the third whorl and from there vanishes gradually. Penultimate whorl about one-seventh the length and one-fourth the larger diameter. Aperture large, nearly two-thirds the total length and one-third the width. Peristome very thin.

Four specimens (USNM 32105) from Marajo Island, Brazil, collected by J. B. Steere; the largest measures: Height 13.5 mm., diameter 7.3 mm., last whorl 11.5 mm., penult. whorl 1.9 mm., aperture 8x4.5 mm. These specimens belong undoubtedly to the type lot, so the original type locality given, "Amazon River," is now restricted to Marajo Island.

Drymaeus abyssorum (d'Orbigny)

Helix abyssorum d'Orbigny, Magasin de Zoologie, vol. 5, p. 15, 1835.
Drymaeus abyssorum Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 192, 1897.
Drymaeus abyssorum Parodiz, Nautilus, vol. 71, p. 24, 1957

Type locality: Pampa Ruiz, between Río Grande, Valle Grande, and Pescado, Bolivia.

Ancey mentioned this species as occurring in the province of Jujuy, in northern Argentina; even if it is scarce in the south we can be sure now of the extension of its geographical range; I have seen two lots (MCZ and MACN) from Jujuy, and Hylton Scott (Acta Zool. Lilloana, vol. 10, p. 24, 1951) recorded the species for the same province, from the locality of San Pedro.

Drymaeus oreades (d'Orbigny)

Helix oreades d'Orbigny, Magasin de Zoologie, vol. 5, p. 11, 1835.
Drymaeus oreades, Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 277, pl. 44 f. 95–96, 1897.
Drymaeus oreades Parodiz, Nautilus, vol. 71, p. 25, 1957.

The type locality for this species is "near San Roque," Corrientes, Argentina, in a damp forest on the south bank of the Río Santa Lucia (about 50 miles from Bella Vista on the Paraná River). We did not find the species when collecting in that region, and it has not been recorded from Corrientes since d'Orbigny, so far as known. It is probably more abundant in southern Brazil, inasmuch as Pilsbry cited specimens from near Saõ Paulo, and those examined in the U.S. National Museum are also from southern Brazil.

Drymaeus lynchi Parodiz

Drymaeus lynchi Parodiz, Comun. Zool. Mus. Hist. Nat. Montevideo, vol. 2, no. 27, pl. 1, 1946.
Drymaeus lynchi Parodiz, Nautilus, vol. 71, p. 25, 1957.

As I stated in the original description, the type locality "Pozo de Vargas" (collectors E. Lynch and E. Holmberg 1908), in the zone of the "Oriental Cordillera of Bolivia" between Río Grande and Parapeti, is very probably an old toponym no longer in use, inasmuch as it is not found in modern maps.[1] Recently I had opportunity to examine many other lots from Corumbá, on the right shore of the Paraguay River, Brazil-Bolivia border. All the specimens agree perfectly with the original description; this agreement shows that the species has an unusual constancy of characters, even in the young, which are so variable in other species of the same group. Following are the ten

[1] Zoologists will find the best map for distribution of this interesting malacological zone in: Lizer, C. A., Informe sobre la expedicion al Chaco boliviano, (Boletin Minist. Agricultura, Buenos Aires, vol. 24 p. 26, 1919).

lots of specimens identified from Corumba (the number of specimens are in parentheses after the museum catalog number):

USNM: 307467(13), 307460(2), Smith coll.; 530578(3), Fulton coll.; 198539(3) Rolle coll.; CM: 3019(1), Stupakoff coll.; 62–1068(10), 62–1069(3), 42.034(8), Smith coll.; MCZ: 89562(1), 26734(1).

Drymaeus harringtoni Marshall

Drymaeus harringtoni Marshall, Proc. U. S. Nat. Mus., vol. 77, art. 2, pl. 1, fig. 7, 1930.

Type locality: General Ballivian, Salta, Argentina.

The type and only specimen (USNM 38070) known under this name is a peculiar individual among the very variable *Drymaeus hygrohylaeus* (d'Orbigny). I examined many specimens of *D. hygrohylaeus* from Salta and Jujuy (in the collections of MACN) showing a complete transition between this species and *D. harringtoni*. The figure in Marshall's original description of the species is not correct, because the specimen is placed in a position which makes the basal expansion of the peristome seem shorter than it actually is in the type, which is as in *hygrohylaeus*. Thus, *harringtoni* must be included in the synonymy of *hygrohylaeus*.

Drymaeus poecilus (d'Orbigny)

Helix (*Cochlogena*) *poecila* d'Orbigny, Magasin de Zoologie, vol. 5, p. 11, 1835.
Bulimus pictus Bonnet, Rev. et Magasin de Zoologie, vol. 16, p. 69, 1864.
Otostomus (*Mesembrinus*) *poecilus* Doering, Bol. Acad. Nac. Ciencias, Córdoba, vol. 3, p. 76, 1879.
Drymaeus poecilus, Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 285, 1898.
Drymaeus poecilus, Dall, Smithsonian Misc. Coll., vol. 49, no. 17, p. 3, 1911.
Drymaeus poecilus, Parodiz, Nautilus, vol. 71, p. 25, 1957.

Type locality: Santa Cruz de la Sierra, Bolivia.

Pilsbry and Dall made commendable attempts to define the typical form of this species. Pilsbry rightly noted that those specimens from Chota, Peru, mentioned by Lubomirsky and Dall, are very probably not *poecilus*, but it is no less true that Dall had good reasons to doubt the identity of Matto Grosso specimens referred to this species by Pilsbry. Dall said that the series from Ollantaytambo, Peru, collected by the Yale Expedition in 1911, "permits one to come to some conclusions" but these conclusions were not very clear, because they were based mostly on specimens from the Urubamba Valley (where they are "hard to find"), 1500 miles northwest of the places where the other forms of *poecilus* are often found under very different ecological conditions.

I have examined several hundred specimens from many localities in different museums, and I think the solution lies in (1) determining just what d'Orbigny's typical form and its distribution is; (2) providing a better definition of var. *minor* d'Orbigny; (3) determining what are

the forms mentioned from Corumbá, Matto Grosso. When these points are settled, we can distinguish the following fine subspecific forms.

Drymaeus poecilus poecilus (d'Orbigny)

This is the form which d'Orbigny himself called *major* (Voyage dans l'Amerique méridionale . . ., vol. 9 (Atlas Zool.), Moll. pl. 31, figs. 7 and 8, 1836; Reeve's Conchologia iconica, vol. 5, *Bulimus*, f. 91, 1848), but inasmuch as d'Orbigny referred to it as the first, most abundant and typical form, there is no reason to maintain such a subspecific name; this is indeed the typical form because it has the principal features of the Latin and French descriptions and because its range is southward from the foothills of Bolivia to the Argentine province of Catamarca [2], about 1,000 miles southwest of Corumbá (where it is not found but is replaced by other subspecies). Positively *poecilus poecilus* is not living in Peru, Matto Grosso, or even eastern Bolivia; its distribution in Argentina includes the provinces of Salta, Jujuy, Formosa, Tucumán, Catamarca, and Santiago del Estero; the other forms are absent from that area. This separation prevents in greater part any interbreeding; thus the characters are more permanent, and the typical form represents a well-limited subspecies. This limitation does not apply with the other varieties, because at Corumbá several races are living together. Perhaps, in its extreme northern limit, *poecilus poecilus* makes contact with some supposed varieties from Peru (the many Dall "mutations") and some interbreeding may occur, but in the rest of the area it remains as a pure stock. This fact, very simple, was often missed, because the earlier writers used mostly northern or eastern materials rather than those from the Bolivia-Argentina border.

Drymaeus poecilus minor (d'Orbigny)

Drymaeus poecilus minor, Parodiz, Nautilus, vol. 71, p. 25, 1957.

Plate 2, Figure 10

This form is distributed on the low plains of Bolivia from the foothills to the eastern region of the upper Paraguay River and makes contact at Corumbá with other forms; some specimens show a slight relationship with these forms, but the subject form, especially from the western side of the plains, can be readily identified with d'Orbigny's (1836) figure 6.

The form has no dark subsutural spiral band, except rarely one broken up into spots, and many specimens from Corumbá accord with the author's description. The other variations included by d'Orbigny are localized in different forms as we shall see later. Also under *minor* were included specimens of another species, D. *lynchi* Parodiz (which is d'Orbigny's fig. 10); however, *poecilus* never has axial

[2] Doering (1879) said that Brackebusch and Hieronymus collected the species very abundantly in Catamarca, but according to our records it is more abundant in Tucumán.

stripes, but does always have a colored umbilicus. It is very doubtful that those referred to by Dall as var. *minor*, from Sierra Madre, Venezuela, belong to any form of *poecilus*.

Drymaeus poecilus tricinctus, new subspecies

PLATE 2, FIGURE 11

Shell rimate, with shorter spire than in *ictericus*, diameter less than half of the total length, and last and penultimate whorls three-fourths and one-sixth respectively, of the same length. Six whorls, the first three yellowish roseate, the following white, with the suture, especially in the superior whorls, whiter. Three dark chestnut bands: one starting in spots at the third whorl, becoming solid half-way to the lip; the second, fused with the suture, wider in the last whorl; another shorter, around the umbilical area; the edges of the bands are clearer chestnut to yellowish; the three bands are perfectly visible inside the aperture, which, like the rest of the shell, is white. A ridge or scar is strongly marked on the dorsal side of the last whorl, but does not produce divergence of the pattern as in *ictericus*. Aperture a little longer than half of the total length of the shell. The shell is more narrowly umbilicated than any other form of *poecilus*.

Holotype (USNM 307436) from Bolivia (Henderson collection, ex R. C. Redfield collection). Another specimen (USNM 609318) is from Peru. The holotype measures: Height 26.6 mm., major diameter 12 mm., minor diameter 11 mm., last whorl 19.8 mm., penult. whorl 4.3 mm., aperture 14x4.5 mm.

None of the many specimens of *poecilus* seen from Corumbá are similar; the locality in Bolivia evidently is from the foot of the Cordillera Oriental to the north. The form has a slight resemblance to *Drymaeus nigrofasciatus* Pfeiffer, but the distinctive characteristics are evident.

Drymaeus poecilus ictericus (Ancey)

PLATE 2, FIGURE 10

Bulimulus poecilus icterica Ancey, Journ. Conchology, vol. 7, p. 92, 1892.
Drymaeus poecilus ictericus, Parodiz, Nautilus, vol. 71, p. 25, 1957.

Type locality: "Province of Matto Grosso, Brazil."

Even though this subspecies is the most variable of all the forms, when the *poecilus poecilus* and *minor* have been separated, the problem of its identification is in a great part cleared up. It is possible to distinguish among specimens of this form some biotopic populations or clines which cannot be treated as taxonomic units because they present a character gradient.

This subspecies represents Pilsbry's "red variegated specimens," and can be recognized by the pink or sometimes lilac subsutural band

and umbilical region; the other spiral bands are brown and very narrow. This variety is more solid and heavy than any other; young specimens are yellowish. All are from Matto Grosso at Corumbá, and are never found in eastern Bolivia or northern Argentina. Many specimens agree perfectly with Ancey's description, but some populations are very variable in color; these variations seem to be the result of gradation between two extremes, as follows:

(a) Typical *ictericus*, always with sutural bands pink and the other bands pale brown. No black bands, and the pink-lilac umbilical area is not margined with black.

(b) Atypical form, with the sutural band very dark, sometimes black, which continues to the umbilicus edging the pink area. Other spiral bands are often very dark, too, with pink, yellow, or light-brown zones in between.

Between the two extremes we can find all kinds of combinations. Probably there is interbreeding not only among these populations, but also with those of form *minor* at the extreme eastern range; d'Orbigny's figures 5 and 9 are among these variations.

There is one lot (CM 62.1070) which resembles *D. lynchi* in pattern (only two individuals), but they are shorter and solid and are tinted with pink outside, inside, and over the umbilical area.

A peculiar feature, more evident in *ictericus* than in any other subspecies, is the strong scar on the last whorl, behind the aperture, that looks like an anomaly or fracture of the shell. This scar is a permanent characteristic in 75 percent of the specimens of typical *ictericus*, and in 50 percent of the populations. This scar produces a divergence in the colored pattern; in *poecilus poecilus* it is rare, and when present only slightly noticeable.

Drymaeus poecilus percandidus Dall

Drymaeus poecilus percandidus Dall, Smithsonian Misc. Coll., vol. 59, no. 14, p. 3, 1911.

Specimens (USNM 250245) are from north of Santa Ana and Ollantaytambo, Peru. Larger form, with more convex whorls; entirely white and different from those of Matto Grosso (Dall distinguished also 10 "mutations," all from Peru, very difficult to identify). Never found with the other southern subspecies; inasmuch as its author did not mention any comparisons, it may be a different species.

Drymaeus andicola (Pfeiffer)

Bulimulus andicola Pfeiffer, Proc. Zool. Soc. London, pt. 14, p. 115, 1846.
Bulimulus (*Bostryx-Lissoacme*) *andicola* Pilsbry, Manual of conchology, ser. 2, vol. 10, p. 166, 1896.

Type locality: "Andes of Bolivia."

It is a rare and peculiar species, because the last whorl has a rather cylindrical configuration, and the spire is conic and has convex whorls. I have seen only one specimen in the U.S. National Museum that agrees with Pfeiffer's description. It is not a *Bulimulus* or *Lissoacme*, but its protoconch is typically pitted as in *Drymaeus*.

Drymaeus papyraceus (Mawe)

?*Helix* (*Cochlogena*) *lita* Férussac, Prodrome, p. 54, no. 403, 1819 (name only and without locality).
Helix papyracea Mawe, Linnean system of conchology, p. 168, 1823.
Drymaeus papyraceus, Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 250, 1897.
Drymaeus papyraceus, Parodiz, Nautilus, vol. 71, p. 24, 1957.

Type locality: Bahia, Brazil.

This species reaches the southernmost range of the genus. It is common in the Mesopotamian provinces of Argentina (Corrientes and Entre Ríos), but is never found west of the Paraná River where it is replaced by other forms of the *poecilus* group. It is very abundant on Martín García Island, of the Río de la Plata, and in Uruguay. Typical *papyraceus* are those of Brazil (Rio de Janeiro northward); the southern specimens, of Río Grande do Sul, Argentina and Uruguay, belong to the following subspecies:

Drymaeus papyraceus papyrifactus Pilsbry

Drymaeus papyraceus var. *papyrifactus* Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 252, 1898.
Drymaeus papyraceus papyrifactus, Parodiz, Nautilus, vol. 71, p. 24, 1957.

Type locality: Curitiba, Paraná, Brazil.

There is one specimen in the USNM collection (107570) which is labelled "from Buenos Aires." At the present time the subspecies has disappeared from the Buenos Aires area, if it ever existed there. Many other specimens of this subspecies from Uruguay and southern Brazil were examined (in USNM, MCZ, CM, and MACN).

The bibliographic references of the last century regarding *D. papyraceus* were given by Pilsbry in 1898 completely enough to obviate repetition here, but in the present century some authors have again used the name "*litus*" for the species; a rectification of this usage is needed:

Helix lita Férussac 1819 is a nomen nudum because it was mentioned in the "Prodrome" only by name, without description or figures. Recently, Barattini (Malacologia Uruguaya, Publ. Cient. Serv. Oceanog. Pesca, no. 6, p. 220, 1951) listed the species as *Drymaeus litus* (Reeve); such a species does not exist, because very clearly Reeve included the name *lita* Férussac in the synonymy of *papyraceus;* this mistake was due to Pilsbry's reference to Reeve's figure 236 as "*litus*," which actually was named by Reeve *papyraceus;* furthermore,

Pilsbry referred to his figure (pl. 51, fig. 6) as being taken from the "Conchologia iconica," but it is not the Reeve figure. The original reference that Barattini gave is: "*Drymaeus litus* Reeve 1843, page 236"; Reeve did not use the generic name *Drymaeus*, which was created by Albers in 1850; there is no *litus* Reeve; the year of Reeve's publication is 1849, not 1843; and "page 236" is correctly "figure 236." This shows that Barattini knew only Pilsbry's references, even when he said that "the species of Reeve is according to the specimens from Uruguay." In addition, Formica Corsi's figure of "*Bulimulus sporadicus*" (Anales Mus. Nac. Montevideo, vol. 2, p. 408, fig. 28, 1900) is *Drymaeus papyraceus*.

Drymaeus elongatus Roeding

Helix elongata Roeding, Mus. Boltenianum, Hamburg, p. 107, no. 1371, 1798 (named for the specimen in Chemnitz, Neues systematisches Conchylien-Cabinet, vol. 9, fig. 1225a).

Drymaeus elongatus, Pilsbry, Manual of conchology, vol. 12, p. 23, pl. 11, figs. 1–26, 1899.

Type locality: Unknown. The typical specimens are from Puerto Rico.

One specimen (USNM 133603) from Nicaragua has been identified provisionally as belonging to this species. All other known specimens of *elongatus* are from Puerto Rico and the Lesser Antilles to Curaçao; this is the first recorded for continental Central America, but it needs further confirmation. The structure of the protoconch indicates that it belongs to the subgenus *Leiostracus*.

Genus *Protoglyptus* Pilsbry 1897

Subgenus *Rimatula* Parodiz 1946

Protoglyptus (Rimatula) minutissimus, new species

Shell very small and narrowly rimate, more than three times longer than wide, the upper half almost conic and lower half oblong; rather solid but translucent, of corneous appearance. Shell composed of 6½ whorls, the last almost 60 percent of the total length, regularly convex with a well-impressed, somewhat crenulated suture. Surface horn colored, crossed by oblique white incremental lines variable in width, which are more evident in the last two whorls; under the microscope the surface shows a few very fine spiral lines, especially around the umbilical and sutural areas. Umbilical rimation covered by an expansion of the peristome. Aperture ovate, angulated at the superior end and at the base; one-fifth as wide as the total length of the shell; peristome simple, not reflected but rather thick on the columellar side.

Columella inclined 5° to the right and in the same degree that the suture is inclined in relation to the base. Spiral angle 25°.

Holotype (USNM 361797) from Choretirni, southern Bolivia, collected by G. L. Harrington, August 1923. It measures: Height 9.5 mm., major diameter 3.8 mm., minor diameter 3.5 mm., last whorl 5.9 mm., aperture 3.8x1.9 mm. Seven paratypes, young.

The locality Choretirni (or Choreti, as it is given often on maps) is southwest of Lagunilla and Charagua, near the confluence of the rivers which form the Parapeti, at the foot of the Cordillera Oriental.

The ribs of the protoconch in this species are well separated but not strong as in other *Protoglyptus* (25 in the first whorl) and more numerous in the young (about 30), without traces of spiral lines between.

This species is the smallest of all the known *Protoglyptus*. In 1946 (Comun. Zool. Mus. Hist. Nat. Montevideo, vol. 2, no. 27) I described *P. deletangi* (from the province of Salta, Argentina), which was only 13.5 mm. in length. Haas in 1948 (Fieldiana Zool., vol. 31, p. 190) described *P. subcostatus*, even smaller (12.4 mm.), from Peru, but *minutissimum* is indeed a real pygmy among the smaller *Protoglyptus*.

P. deletangi Parodiz is 40 percent larger and is very elongated, somewhat pupoid in form, with a smaller aperture and a more oblique suture (15°); the ends of the aperture are more separated. *P. subcostatus* Haas, on the other hand, is a broader species, with the length of aperture and width of last whorl both less than one-third the total length, with stronger growth ribs, one more whorl, base of aperture not angulated, and umbilicus and peristome pink with a brown belt around the umbilical zone. The new species does not present any peculiar coloration.

Protoglyptus (Protoglyptus) cutisculptus (Ancey)

Protoglyptus montivagus Pilsbry (in part), Manual of conchology, vol. 11, p. 90, 1897.

Bulimulus cutisculptus Ancey, Le Naturaliste, ser. 2, no. 339, p. 92, 1901.

Ancey proposed the name *cutisculptus* for specimens referred to as *montivagus* from Corumbá, Matto Grosso, "in the case this form proves distinct from d'Orbigny's." He says that it is "perforate (not narrowly rimate as in *montivagus*), uniform horn-colored, larger, with fine spiral striae on the epidermis similar to those observed in *trichodes*, the same as figured by Reeve under *montivagus*." This indication is enough according to the International Rules of Zoological Nomenclature to give validity to Ancey's name.

Pilsbry (1897) had distinguished the form from Corumbá as "russet or corneus-brown, without stripes or with one or a few on the last whorl." The surface is shining and shows very minute spiral cuticular

striae under a strong lens, the striae, perhaps, very shortly pilose, 8 whorls decidedly convex, the earliest 1½ longitudinally delicately costulate. Height 20, diam. 7, alt. of aperture 7 mill."

Topotypes (USNM 198366, coll. Rolle, 1904; and CM 1761, coll. H. H. Smith, 1896) were easily recognized as the species named *cutisculptus* Ancey and the same as the specimens from Corumbá distinguished by Pilsbry. A redescription of the species is necessary, and it is as follows:

Shell perforate, slender, diameter scarcely larger than a third of the total length (33.7 percent). Color brown grayish, but whitish in parts where the thin periostracum is lacking. Whorls 8½ regularly convex, with a well-impressed but irregular suture having a crenulated appearance. Surface almost smooth, with irregular lines of growth, crossed by microscopical spiral striae most noticeable around the umbilical zone and on the upper area of the last whorl above the aperture. Last whorl a little longer than half the length (57.7 percent) with the right wall behind aperture flattened. Aperture vertical oval, almost one-third of the total length; columellar lip broader and the ends of peristome more closely approximated than in other species, joined by a thin callus; on the outer lip there is a small sinus produced by a shallow notch on the wall of the whorl. The vertical sculpture of the protoconch is more irregular and waved than in other *Protoglyptus;* it resembles that of *Scansicochlea* in that the spaces between the ribs show a few microscopical spiral lines. *P.* (*P.*) *cutisculptus* differs from *montivagus*, which belongs to the subgenus *Rimatula*, by having a perfectly open umbilicus which is well separated from the columellar expansion by its size, shape, color, and microscopical sculpture. *P. crepundia* is also a very closely related species, but it is shorter, more inflated, with brown and white stripes, wider aperture, and less well-developed peristome.

Pilsbry supposed that the Corumbá specimens were perhaps very shortly pilose. Examining the shell under microscope, I found, but only in one specimen, very short, hardly distinguishable hairs on the spiral lines around the umbilicus, and those are without the granulate structure found in *trichodes* d'Orbigny. Possibly these hairs are only remains of a juvenile character.

Pfeiffer (Monographia helicearum viventium, col. 2, p. 112, 1848), distinguished a variety *b* of *montivagus*, from Chiquitos, Bolivia, larger, and with measurements similar to those specimens now observed. *P. montivagus* is a form living far to the southeast (loc. d'Orbigny's Caballu-Cuatia, now La Paz), in the province of Entre Ríos, Argentina; I have examined in the collections of the Museo Argentino de Ciencias Naturales at Buenos Aires many specimens from Bolivia which belong to some variety of *montivagus* but are quite different from *cutisculptus*.

The specimens measure (in mm.):

	Height	*Diameter*	*Last whorl*	*Aperture*
USNM	23	8	13	8. 9x5. 1
	22. 2	7. 5	12. 5	8. 5x5
	22. 2	7. 3	12. 5	8. 5x5
CM	20. 4	7	12	7. 9x5

In all specimens: Sutural angle 9°, spiral angle 26°.

I have also seen material of *P. montivagus* from different localities of Bolivia and Argentina, as given below. The numbers in parentheses are of the mollusk catalog of the Museo Argentino de Ciencias Naturales. The names immediately following the numbers are those of the collectors; dates of collection follow the names of collectors if available. Provinces are shown in italic.

Bolivia: Between Izozo and Santa Cruz (2126); Carandaity (3127); Charagua (3128); near Parapeti River to Lagunilla (9340); all collected by C. Lizer and L. Deletang, 1917.

Argentina: Catamarca: La Puerta, Department of Ambato (483), A. Keravenant. *Tucumán:* Tapia (1344), E. L. Holmberg. *Tucumán:* North of Sierra San Javier (9860), F. Pastore, 1916. *Entre Ríos:* Paraná (9998), J. Frenguelli 1920; (14644), J. Migoya, 1924. *Tucumán:* Lamadrid (12116), W. B. Alexander, 1921. *Santiago del Estero:* Cerro del Remate (23044/45), J. Yepes and R. Schreiter, 1926.

All these specimens of *montivagus* are smaller than any of the *cutisculptus* I have now at hand.

Genus *Kuschelenia* H. Scott, 1951

Kuschelenia simulans H. Scott

Kuschelenia simulans H. Scott, Acta Zool. Lilloana, vol. 12, p. 539, 1951

The type, in the collection of the author, is from Potosí, 50 miles south of Sucre, Bolivia. I have compared this type with one specimen in the U.S. National Museum (596937), which proves to be the same species, but is labelled as coming from Peru. Mrs. M. H. Scott de Birabén assured me that the identification of the specimen is correct.

The external characters of *Kuschelenia* are somewhat like *Plectostylus-Drymaeus*, but the principal differences are based upon the anatomy: Radula similar to *Bulimulus;* seminal peduncle short and seminal vescicle cylindrical and canal deferens terminal; all these characters of the genitalia are different from those of *Bulimulus*, *Drymaeus*, and *Plectostylus*.

Genus *Peronaeus* Albers, 1850

Subgenus *Lissoacme* Pilsbry, 1896

Lissoacme is included as a subgenus of *Peroneaus* and the original Pilsbry's combination *Bulimulus* (*Bostryx-Lissoacme*) is separated for reasons given in my previous paper "Los géneros de los Bulimulinae argentinos" (Rev. Mus. La Plata, new series, Zool., vol. 4, p. 338, 1946).

Peronaeus (*Lissoacme*) *tyleri* (Dall)

Bulimulus tyleri Dall, Smithsonian Misc. Coll., vol. 59, no. 14, p. 6, 1912 (new name for *B. simplex* Hupe, 1857, not Jonas 1842).

Type locality: Santa Ana, in the Urubamba River valley, Peru.

The protoconch of the two "cotype" specimens (USNM 250261) is not angulated and striated as it is in *Bulimulus*, but is completely smooth, and all the characters are as in *Peronaeus* (*Lissoacme*).

Peronaeus (*Lissoacme*) *borellii* (Ancey)

Bulimulus borellii Ancey, Bull. Mus. Zool. Torino, vol. 12, no. 309, p. 13, 1895.
Bulimulus (*Drymaeus*) *chacoensis* Preston, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 491, 1907 (not *B. chacoensis* Ancey 1897=*Protoglyptus*).
Peronaeus (*L.*) *borellii*, Parodiz, Nautilus, vol. 71, p. 23, 1957.

Type locality: Misión San Francisco, Bolivia.

This species belongs to the group of *torallyi* d'Orbigny composed of species belonging to *Peronaeus* (*Lissoacme*), not *Drymaeus* as supposed by earlier authors. The type specimen of *chacoensis* Preston (USNM 202509) is perfectly identifiable with *borellii*.

Peronaeus (*Lissoacme*) *torallyi nigroumbilicatus* (Preston)

Bulimulus (*Drymaeus*) *nigroumbilicatus* Preston, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 491, 1907.
Peronaeus (*Lissoacme*) *torallyi nigroumbilicatus* Parodiz, Comun. Zool. Mus. Montevideo, vol. 2, no. 38, p. 20, 1947.

Type locality: North of Pilcomayo River, Chaco region, Bolivia.

This is the form of *torallyi*, with black umbilicus and apex, referred to by d'Orbigny (1837); the apex is often black in the typical form of the species, but the dark umbilical area is characteristic of this subspecies. In 1947 I described this form as new under the same name *nigroumbilicatus*; thus the name becomes a synonym and homonym of Preston's name, but the generic and specific combination remains as I stated. The specimens I used as types on that occasion came from Embarcación, Salta, Argentina (MACN 8848), collected by J. Steimbach, 1916. Other specimens are from the Bolivia-Argentina border, near the Pilcomayo River, (MACN 1311), collected by E. A. Holmberg, Jr., 1908, Yacuiba, Bolivia, near Argentine border (MACN 11008), collected by J. Steimbach, 1920.

The subspecies is limited to the Pilcomayo River area, on the Argentina-Bolivia border; all specimens of *torallyi* from north of that area belong to different subspecies.

Peronaeus (Lissoacme) longinquus (Morelet)

Bulimus longinquus Morelet, Series conchyliologiques, vol. 3, p. 195, 1863.
Drymaeus longinquus, Pilsbry, Manual of conchology, ser. 2, vol. 11, p. 293, 1898.

Type locality: Western slope of Vilcanota range, southeastern Peru. One specimen (USNM 250244) from southern Peru, rare.

Genus *Paeniscutalus* Wurtz, 1947

Paeniscutalus crenellus (Phillippi)

Bulimus crenellus Philippi, Malakozool. Blatt., vol. 14, p. 67, 1867.
Megalobulimus (Microborus) incarum Pilsbry, Nautilus, vol. 58, p. 29, 1944.
Bulimulus (Paeniscutalus) incarum Wurtz, Nautilus, vol. 61, p. 12, 1947.

Type locality: "Hacienda de Unigambal"; Huaraz, Peru, for *incarum*.

According to the lots studied in the U.S. National Museum and the Museum of Comparative Zoology and according to Bequaert's opinion (Bull. Mus. Comp. Zool., vol. 100, p. 169, 1948), *incarum* Pilsbry is a synonym of *crenellus* Philippi. The principal differences of *Paeniscutalus* are anatomical; the protoconch of the shell shows axial ribs broken or segemented into elongated granules. Wurtz stated that the species, by its conchological characters, is placed "in the second division of *Bulimulus* (sensu lato)"; inasmuch as these Bulimuli are now separated into several genera, very different from *Bulimulus*, the position of *Paeniscutalus* should be that of a genus rather than a subgenus.

Genus *Scutalus* Albers, 1850

Scutalus tupacii (d'Orbigny)

Helix tupacii d'Orbigny, Mag. Zool., vol. 5, p. 16, 1835.
Bulimulus (Scutalus) tupacii, Pilsbry, Manual of conchology, vol. 11, p. 19, 1897.
Scutalus tupacii, Parodiz, Nautilus, vol. 70, p. 134, 1957.

Type locality: La Paz, Bolivia.

This is the only species of the genus found as far south as Argentina, and it is one of the most characteristic and abundant forms in the northwestern part of this country, in the provinces of Salta and Jujuy, and especially in Tucumán; it also extends a little to the east, in Santiago del Estero. Besides many lots in the U.S. National Museum, the Museum of Comparative Zoology, and the Carnegie Museum, hundreds of other specimens were examined in the Museo Argentino de Ciencias Naturales.

While collecting in Misiones (northeastern Argentina) in 1943, I found a specimen which allows one to suppose the presence of *Scutalus* even there, but the specific identification is still very doubtful. Actually, the area of distribution for the genus is from lat. 13° S. in Peru to 27° in Argentina.

Genus *Scholvienia* Strebel, 1910

Scholvienia tarmensis weeksi (Pilsbry)

Bulimulus (*Protoglyptus*) *weeksi* Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, vol. 82, p. 357, 1930.

Type locality: Oroya, near Tarma, 12,000 feet, east-central Peru.

The localities for *tarmensis* Philippi and *weeksi* Pilsbry are the same. Topotype specimens in the collection of the U.S. National Museum (Nos. 272199 and 601809; collectors, Rose and Weyrauch, respectively) that are similar to the original figure of *weeksi* (Pilsbry, fig. 9) show this form to be a subspecies of *tarmensis* Philippi, as are those specimens mentioned by Hidalgo (Moluscos delal viaje Pacifico . . . , 1869) and figured by Pilsbry (Manual of conchology, vol. 11, p. 24, fig. 70, 1897). The protoconch in *tarmensis weeksi* is not like that in *Protoglyptus* but is as in *Scholvienia*.

Genus *Plekocheilus* Guilding, 1828

Subgenus *Eurytus* Albers, 1850

Plekocheilus (*Eurytus*) *ameghinoi*, new name

Bulimus guildingi Dohrn, Jahrb. Deut. Malak. Ges., vol. 2, p. 307, 1875 (not *guildingi* Pfeiffer, 1842).

Plekocheilus guentheri (Sowerby) Pilsbry, Manual of conchology, vol. 14, p. 129, in part, 1902.

Type locality: "Nueva Granada" (Colombia).

Pilsbry in 1902 suppressed *guildingi* Dohrn in favor of *guentheri* Sowerby (Proc. Zool. Soc. London, p. 296, 1892), but Dohrn's and Sowerby's species are two quite different forms: In *guentheri* the last whorl is much wider, the internal and external color different, without post-peristomatic white margin. Prior to the change of the name, Pilsbry (Manual of conchology, ser. 2, vol. 10, p. 72, 1895) placed *guentheri* as a variety of *guildingi*, but a separation is necessary, and *guildingi* Dohrn still needs a new name. In giving the new name, I take the opportunity to honor the great South American naturalist Florentino Ameghino, whose centennial was celebrated in 1954.

Genus Auris Spix, 1827

Subgenus *Eudolichotis* Pilsbry, 1896

Auris (Eudolichotis) glabra (Gmelin)

Voluta glabra Gmelin, Systema naturae, ed. 13, vol. 1, p. 3436, 1790.
Auris (Eudolichotis) glabra Pilsbry, Manual of conchology, ser. 2, vol. 10, p. 113, 1893.

Type locality: Tobago Island.

The species is well represented in the collections of the U.S. National Museum and the Museum of Comparative Zoology by many lots from the islands of Tobago, Trinidad, and Grenada. Between *glabra* and *aurisciuri* (Guppy) there are close relationships, and these two as well as the farm *grenadensis* (Guppy), occur in Trinidad, the last very probably also in the Guianas. Some specimens of *aurisciuri* from Margarita Island, have the same size and thickness and are very similar to *glabra grenadensis*. The color is very variable, with intergradation among the three forms. Even if *glabra*, *aurisciuri*, and *grenadensis* are predominant in Tobago, Trinidad, and Grenada, respectively, introduction and hybridization may be common.

Auris (Eudolichotis) dillwyniana spectrum (Albers)

Bulimus spectrum Albers, Malakozool. Blätt., vol. 1, p. 219, 1854.
Auris (E.) midas spectrum Pilsbry, Manual of conchology, ser. 2, vol. 10, p. 119, 1896.

Type locality: "New Granada" (Colombia).

Some authors placed *spectrum* as a variety of *midas*. Pilsbry said he did not see *dillwyniana*, "which is similar in form and coloring." Based on a comparison of specimens as well as descriptions, my opinion is that *spectrum* is a subspecies of *dillwyniana*. The two species have the same type locality.

Subfamily Odontostominae

Genus *Odontostomus* Beck, 1837

Odontostomus fasciatus tenuisculptus, new subspecies

Plate 1, Figures 1, 2

Differs from typical *fasciatus* by its very fine sculpture, more diaphanous and thinner shell, and reddish color under the cuticle. There is a noticeable difference between the color of the cuticle and that of the naked shell; the periostracum may be cinnamon colored or

rather yellowish, but underneath the shell is very dark. The strong keel at the base is white, and the white line of the suture is narrower. The white "hydrophanous" bands that Pilsbry said are characteristic of *fasciatus* and are essentially cuticular in this subspecies are on the contrary more evident in denuded shells.

Holotype (USNM 316130) from Bogotá(?), Colombia, Henderson collection. Two paratypes. Measurements are as follows:

	Height	*Diameter*	*Aperture*
Holotype	39. 5	12. 5	15x8.5
Paratypes	38. 5	11. 5	14.5x8
	38	11. 5	14.5x8

O. fasciatus has been regarded by authors as a form or variation of *O. grayanus* (Pfeiffer), but Pilsbry thought it might prove to be specifically very distinct (Manual of conchology, ser. 2, vol. 14, 1901). The specimens I have observed indicate that his opinion is entirely correct.

These specimens of *tenuisculptus*, as well as other typical *fasciatus*, are all labelled in the U.S. National Museum as from "Bogota, Colombia, Henderson colln." I suppose that this is a mistake, because all the known species of this genus are living in southern Brazil, Paraguay, and North Argentina. Not one is known from Bolivia, Peru, or Ecuador. The Paraguay River evidently is the extreme western limit of the genus. If the locality "Bogotá" were to be confirmed, we would have to admit to a distribution southeast to northwest across northern Brazil.

Genus *Tomigerus* Spix, 1827

Subgenus *Bonnanius* Jousseaume, 1900

Tomigerus (*Bonnanius*) *ramagei* (Smith)

Bulimus (*Tomigerus*) *ramagei* Smith, Journ. Linn. Soc. London, vol. 20, Zool., p. 500, 1890.

Hyperaulax (*Bonnanius*) *ramagei*, Pilsbry, Manual of conchology, ser. 2, vol. 14, p. 103, 1901.

Type locality: Fernando de Noronha Island.

Topotype specimens (USNM 518215 and CM 3654) were examined.

The presence of this species on Fernando de Noronha Island may be the reason why Pilsbry placed *Bonnanius* as a "section" of *Hyperaulax*. The shape, apertural dentition, and expecially the smooth nucleus are as in *Tomigerus*; *Hyperaulax* has instead a variable zigzag broken sculpture on the protoconch.

The species *Bonnanius bouvieri* Jousseaume (type of genus) is a synonym of *ramagei* Smith.

Genus *Cyclodontina* Beck, 1837

Subgenus *Burringtonia* Parodiz, 1944

Cyclodontina (Burringtonia) pantagruelina (Moricand)

Helix (*Cochlodina*) *pantagruelina* Moricand, (*Helix gargantua* Férussac) Mém. Soc. Phys. Hist. Nat. Genève, vol. 6, p. 542, 1833.
Cyclodontina (*Burringtonia*) *pantagruelina* Parodiz, Comun. Zool. Mus. Hist. Nat. Montevideo, vol. 1, no. 11, p. 4, 1944.

Type locality: Bahia, Brazil.

Many specimens of this peculiar form, which is well known and needs no further comment, were examined (USNM, MCZ, CM, and MACN).

I must, however, repeat my comments on its name combination, because Lothar Forcart (Nautilus, vol. 60, p. 58, 1946) has proposed the subgenus *Pantagruelina*, which is a synonym of *Burringtonia*, but has separated the synonym *H. gargantua* Férussac and placed it under *Bulimus odontostoma* Sowerby (type of *Odontostomus*), a quite different species. I discussed this form in 1944; Burrington Baker (Nautilus, vol. 60, p. 196, 1947) has given further notes on the status of *H. gargantua*.

Subfamily Orthalicinae

Genus *Orthalicus* Beck, 1837

Orthalicus phlogerus (d'Orbigny)

Helix phlogera d'Orbigny, Mag. Zool., vol. 5, p. 8, 1835.
Orthalicus phlogerus Beck, Index molluscorum, p. 59, 1837.
Oxystyla phlogera Pilsbry, Manual of conchology, ser. 2, vol. 12, 1899.

Type locality: Misíon San Javier, province Chiquitos, Bolivia (very probably it is in the region east of Santa Cruz de la Sierra, between the Río Grande and the Río San Miguel).

It is the most southern species of the genus, rare and infrequent in museum collections. It has a curious similarity with *Orthalicus varians* Martens from Venezuela. Specimens in the U.S. National Museum (116141) are from the type locality.

Orthalicus fulvescens Pfeiffer

Orthalicus fulvescens Pfeiffer, Malakozool. Blätt. vol. 3, p. 187, 1856.
Oxystyla fulvescens Pilsbry, Manual of conchology, ser. 2, vol. 12, p. 141, 1899.

Type locality: Río Hacha, Colombia.

Numerous sets of specimens in the U.S. National Museum range from Mexico to Colombia. It is very probable that many albino forms belonging to different species have been grouped under the

name *fulvescens*. In the restricted sense, *fulvescens* is very similar to the form *imitator* Pilsbry of *O. maracaibensis*.

Orthalicus longus Pfeiffer

Orthalicus longus, Pfeiffer, Malakozool. Blätt, vol. 8, p. 16, 1861.
Oxystyla longa Pilsbry, Manual of conchology, ser. 2, vol. 12, p. 126, 1899.

Type locality: Unknown; probably Michoacán, Mexico.

Typical specimens (USNM 133564) from the Gulf of Tehuantepec have a short and solid form, remarkably plicate under the suture, and with strong riblike zones of growth. The variety *boucardi* Pfeiffer (Proc. Zool. Soc. London, p. 139, 1860) is even shorter, with dark and wide axial waved bands. Specimens USNM 408850 and 316352 agree with the description, but there are also many specimens among these with wide white areas (as in Pilsbry, op. cit., figs. 20, 21, 24, and 25 of pl. 20). The form *strebeli* (Pilsbry) is well differentiated, with two black bands on the last whorl; it may be a distinct species, but more observations are necessary as well as a study of its relationship with *O. lividus* Shutt.

Genus Sultana Shuttleworth, 1856

The species of *Sultana* have been referred formerly to *Orthalicus*, but inasmuch as the latter name is used for those species that have as type *Bulimus zebra* (Muller) (see Rehder, Nautilus, vol. 59, p. 29, 1945) and which were placed under *Oxystyla*, we must take up again the name *Sultana* for these species grouped around the type *Helix sultana* Dillwyn, which previously was used for *Orthalicus*. Shuttleworth originally designed *Sultana* as a division of *Orthalicus* (Notitiae Malacologicae, 1856) as follows: *Orthalicus* (p. 57): (1) *Sultana* (p. 58); (2) *Zebra* (p. 60); (3) *Corona* (p. 66); (4) *Porphyrobaphe* (p. 69).

The name given by Shuttleworth to the genus type (in that case a subgenotype) was *Orthalicus* (*Sultana*) *gallinosultana*, a name derived from *Bulimus gallinosultana* Chemnitz. Chemnitz had adopted it from Favanne's name "La Poule Sultana", but according to the Rules of Zoological Nomenclature we must consider the name of Dillwyn (1817), *Helix sultana*, as the first valid use.

Zebra Shuttleworth and *Oxystyla* Schluter are synonyms of *Orthalicus*. Strebel (Mittheil. Naturhist. Mus. Hamburg., vol. 26, p. 3, 1909) used *Zebra* as a genus with *Oxystyla* as a synonym. *Corona* is another genus, of which the type, by subsequent designation of von Martens (Albers, Die Heliceen. . ., ed. 2, p. 226, 1860) is *Helix regina* Férussac.

Thiele in his "Handbuch der systematischen Weichtierkunde," vol. 2, 1931, did not make any mention of *Sultana*, but already in

1899 Pilsbry (Manual of conchology, ser. 2, vol. 12) had used it in Shuttleworth's sense; later (Land mollusca of North America, vol. 2, pt. 1, p. 29, 1946) he adopted Rehder's opinion, which is correct, and placed *Bulimus zebra* as type of *Orthalicus* Beck, 1837, not of "*Orthalicus*" Beck, *in* Gray, 1845 (type *H. sultana*).

Sultana sultana (Dillwyn)

Helix sultana Dillwyn, A descriptive catalogue of Recent shells, vol. 2, p. 290, 1817.

Orthalicus sultana, Pilsbry, Manual of conchology, ser. 2, vol. 12, p. 188, 1899.

Type locality: The Guianas.

Numerous specimens examined in the four museums (USNM, MCZ, CM, and MACN) indicate that this species had a wide and curious distribution: Guianas, northern Brazil, eastern Peru, and northern Bolivia.

I am inclined to think that *Orthalicus meobambensis* Pfeiffer is a synonym, although it may be distinguished as the race or subspecies mentioned by d'Orbigny as occurring in northern Bolivia.

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